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SHORT COMMUNICATION

Important Pathogenic Fungi from Gorakhpur, Balrampur, Bahraich and Shrawasti Uttar Pradesh India

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ABSTRACT
The present report elucidates a rich and unique profile of Mycobial as well as Phytodiversity of research area surveyed with 60 angiospermic host plant species representing 52 genera of 34 different families being parasitized by 52 fungal species representing Twenty-one fungal genera. The survey and documentation have resulted 6 new host records and 5 fungal species to Indian mycoflora.
Keywords: *Pathogenic fungi, Gorakhpur, Balrampur, Bahraich, Shrawasti, Hosts, Status, Uttar Pradesh.*

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INTRODUCTION

India is recognized as one of the twelve mega-diverse countries globally, housing two of the eighteen biodiversity hotspots in the world, specifically located in the Western Ghats and the Eastern Himalayas [1]. To the north of the North Tarai Forests, the Himalayas ascend as a formidable barrier beyond the snow line. Above the alluvial plains, the Tarai strips emerge, characterized as a seasonally marshy area composed of sand and clay soils. The Tarai experiences greater rainfall compared to the plains, and the rivers descending from the Himalayas slow down and disperse in the flatter Tarai region, depositing fertile silt and reproductive materials during the monsoon season, while receding in the dry season. Consequently, the Tarai maintains a high-water table and is distinguished by moist subtropical conditions, supporting a lush turnover of green vegetation throughout the year. The climatological and topographical features promote the abundant growth and development of foliar fungi. This North-Tarai region of Uttar Pradesh ranks just after the Eastern and Western Ghats as one of the prime hotspots for biodiversity in general, and the variety of fungal organisms residing on plant leaves, in particular, presents an excellent opportunity for the morphotaxonomic study of fungal organisms broadly, and pathogenic fungi specifically [2-4].

The Pathogenic Fungi result in significant losses annually across various regions of the globe. The fungal pathogens that cause leaf spots affect a wide range of hosts, including the majority of crops, forests, and other plant species. The damage inflicted by these leaf adversaries presents a serious challenge that we must address. This research aims to identify and document Pathogenic fungi, which will aid in the development of new fungicides and strategies to mitigate the impact of these natural adversaries, as well as to protect floral diversity from these pathogens and conserve the region's valuable flora. With this objective in mind, the authors conducted a survey in the North Tarai Region of U.P., encompassing Gorakhpur, Maharajganj, Shrawasti, Bahraich, and the Balrampur forest division, from November 2023 to January 2025. Forest fungi hold significant importance for both professional mycologists and plant pathologists. Fungal microorganisms cause foliar infections that lead to the breakdown of photosynthetic pigments, thereby reducing the active photosynthetic area of the leaf lamina to varying degrees, depending on the level of infection and disease severity. India, characterized by its subtropical and humid climate in many regions, provides vast opportunities for various fungi, including foliicolous

hyphomycetes, to flourish. North Eastern Uttar Pradesh is one such region, naturally embellished with abundant lush green vegetation of diverse floristic composition, creating an ideal habitat for numerous foliicolous fungal species. Indeed, this area has established itself as a haven for systematic mycologists. Considerable research has been conducted in our country and others around the world.

MATERIAL AND METHODS

The climatic condition favors the growth of various types of phanerogamic vegetation along with seasonal and annual crops and other plants. With a view to study the pathogenic fungi in their natural habitat, frequent collection trips will be arranged. The following articles would be required for collecting pathogenic fungi-collection containers, hand lens, pruning scissor or secateurs, light plant pressures, blotting paper, paper envelope, field note book etc.

Laboratory processing and preliminary examination:

Preparations:

(a) Photograph of both host and pathogen will be taken.

(b) Scrap mount: - If the organisms are superficially attached with the host tissue scrap mounts are made by a sharp razor or scalpel.

(c) Collodion Preparation: - A drop of collodion solution is applied to a colony on the leaf. The fungus gets embedded entirely and the dried film is peeled off readily from the host surface. Removal of colliding by acetone on a glass slide gives undisturbed preparation.

(d) Squash preparation: - The fruiting body is mounted, cleared and examined. Then the preparation is tapped vigorously and reheated. In this way the fruiting body is broken and content is released.

(e) Hand cut Section preparation: A hand cut section of infected tissue is made with sharp razor to study immersed or semi-immersed fungi. Section cutting for host parasite interaction / relation.

Staining and Mounting:

For routine microscopic examination in the laboratory, temporary slides are prepared using various types of stains and mounting media, depending on the specific fungal forms being studied.

(a) Lacto-phenol cotton blue: The lacto-phenol mounting fluid is employed for the mounting of colored fungi. To identify cytoplasm, septa, guttules, and other structures, as well as hyaline forms, a concentration of 0.05-0.01% cotton blue is incorporated.

(b) Polyvinyl Alcohol: Polyvinyl Alcohol is utilized in standard staining and mounting procedures.

(c) Lacto-fuchsin: This stain allows for clearer, faster, and more visually appealing coloration of cell walls, particularly advantageous for photographic documentation [6]. Slides that are prepared with mounting media are subsequently sealed with wax or high-quality commercial nail polish and are preserved for future analysis.

Camera Lucida: - Drawings made of the distinctly different taxa of generic or species rank so as to show the morpho taxonomic features of vital importance.

Morpho taxonomic treatment. - Hitherto undescribed forms of foliar fungi executed with the help of present literature and expertise available at hand.

Slides prepared in cotton blue lactophenol mixture were examined and camera lucida drawing were made which seems to be new as described by Mall, [7-10]. Morphotaxonomic determinations of taxa were done with the help of current literature and resident expertise available. All the fungal taxon were identified after making microscopic preparations and later confirmed by Prof. Kamal, Emeritus Scientist (DST), DDU Gorakhpur University, Gorakhpur. The fungal Holotype specimen is in deposition process in HCIO, IARI, New Delhi Or Tropical Forest Research Institute or A.M.H.

RESULT AND DISCUSSION

The authors surveyed the North Tarai Region of U.P. which includes Gorakhpur, Maharajganj, Shrawasti, Bahraich, Balrampur Forest division during November, 2023 to January, 2025. The authors collected Sixty angiospermic host plant species representing fifty-two genera of 34 different families being parasitized by 52 fungal species representing 21 fungal genera. The host plants and their parasites are enumerated below-

Table1: List of Hosts with their respective Pathogenic Fungi

S.No.	Name of the family & Host	Name of the fungus	Place of Collections
1.	**Acanthaceae** *Justicia* sp. Linn.	*Cercospora justicicola* Tai.	Balrampur
2.	**Amaranthaceae** *Achyranthes aspera* Linn.	*Alternaria* sp. Nees. *Cercospora achiyranthina* Thrim. &Chupp.	Bahraich
3.	**Anacardiaceae** *Mangifera indica* Linn.	*Ascochyta mangiferae* Batista *Meliola rhois* P. Henn.	Balrampur
4.	**Annonaceae** *Annona squamosa* Linn.	*Pseudocercospor amiliusae* Mehrotra & Verma	Bahraich
5.	**Araceae** *Colocasia esculenta* Linn.	*Drechslera colocaceae* Tandan & Bhargava	Gorakhpur
6.	**Asclepiadaceae** *Calotropis procera* R.Br.	*Alternaria alternata* (Fr.) Keissler.	Balrampur
7.	**Asparagaceae** *Dracaena marginiata*Linn.	*Alternaria*sp. Nees	Bahraich
8.	**Asteraceae** *Xanthium strumarium*Linn.	*Alternaria carthami* Chawdhury et al.	Shrawasti
9.	**Brassicaceae** *Raphnus sativus*Linn.	*Alternaria raphani* Groves. &Skolko	Bahraich
10.	**Caesalpiniaceae** *Cassia tora* Linn.	*Pseudocercospora cassiae* Singh & Bhalla	Balrampur
11.	**Cannabinaceae** *Cannabis sativa* Linn.	*Pseudocercospora cannabina* (Wakef.)	Siddhardh Nagar
12.	**Caricaceae** *Carica papaya* Linn.	*Corynespora*sp. Gissow.	Bahraich
13.	**Chenopodiaceae** *Chenopodium album* Linn.	*Pernospora parasi*tica (Pers.)	Balrampur
14.	**Combretaceae** *Terminalia arjuna* W. & A.	*Cercospora* sp. Fres.	Shrawasti
15.	**Convolvulaceae** *Ipomoea fistulosa* Linn.	*Cercospora ipomoeae* Wint.	Bahraich
16.	**Cucurbitaceae** *Luffaacutangula* (L.) Roxb. *Cucurbita maxima* Linn. *Momordica charantia* Roxb. *Lagenaria siceraria* (Mol.) Standl. *Lagenaria vulgaris* Ser.	*Alternaria aternata* (Fr.) Keissler. *Cercospora citrullina*Cook. *Cercospora momordica*Mc. Rai. *Cladosporium cucumerinum* Ellis &Arth *Glomerella cingulata* (Stonem) Spauld &Shrenk.	Bahraich
17.	**Cycadaceae** *Cycas circinalis* Linn.	*Alternaria* sp. Nees.	Balrampur
18.	**Dipterocarpaceae** *Shorea robusta*Gorten. f.	*Ceratophora helicosporium* Sacc.	Bahraich
19.	**Ebenaceae** *Diospyros tomentosa* Roxb.	*Cercospora kaki* Ell. &Ev.	Shrawasti
20.	**Euphorbiaceae** *Codiaeum variegatum*Bl. &Hort . Spiral leaf Croton. *Mallotus philipensis*Muell. Arg.	*Alternaria aternata* (Fr.) Keissler. *Alternaria aternata* (Fr.) Keissler	Bahraich
21.	**Fabaceae** *Bauhinia vahlii* W. & A. Prod. *Dalbergia sissoo*Roxb. *Cassia fistula* Linn. *Dolichos lablab* Linn. Lynos.	*Alternaria bauhinia* Singh *Alternaria delbergicola* Nees.. *Alternaria tenuis* Nees. *Cercosporadolchi.* Ellis &Ev.	Balrampur
22.	**Lamiaceae** *Ocimum sanctum* Linn.	*Alternaria* sp.Nees. *Cercospora oocimicola* Petrak & Ciferri	Bahraich
23.	**Malvaceae** *Hibiscus mutabilis* Linn. *Hibiscusrosa-sinensis* Linn.	*Alternaria dianthi* Stev. & Hall. *Alternaria longipes* (Ellis. &Ev.) Mason	Bahraich

24.	**Meliaceae** *Azadirachta indica*A Juss.	*Oidium azadirachtae* Narayan &Ramakr.	Shrawasti
25.	**Moraceae** *Ficus carica* Linn. *Ficus glomerata* Linn. *Artocarpus heterophyllus* Lamk. *Ficus religiosa* Linn. *Morus alba* Linn	*Alternaria aternata* (Fr.) Keissler. *Alternaria aternata* (Fr.) Keissler. *Alternaria tenuissisma* (Kunz ex.Pers.) Wittshire *Cladosporium artocarpi* Kuthare & Singh *Cercospora fici – religiosa* Heold&Worf. *Pseudocercospora mori* (Hard) Deighton	Balrampur
26.	**Musaceae** *Musa paradisiaca* Linn.	*Alternaria*sp. Nees.	Shrawasti
27.	**Nyctanthaceae** *Nyctanthesarbor-tristis* Linn.	*Stenella* sp. Syd.	Balrampur
28.	**Nyctaginaceae** *Boerhavia diffusa* Linn.	*Pseudocercospora* sp. Speg.	Gorakhpur
29.	**Papilionaceae** *Pisum sativum* Linn. *Cajanus cajan* (Linn.) Millsp.	*Helminth sporium* sp. Link. *Phomacajani* Rangel Khune and Kapoor	Balrampur
30.	**Poaceae** *Arunda donax* Linn. *Saccharum munja* Linn.	*Cladosporium* sp. Link. *Helminthosporium* sp. Link	Bahraich
31.	**Rosaceae** *Rosa indica* Linn. *Prunus persica* Stocks.	*Acremonium* sp. Link. *Coelomyces* sp.	Balrampur
32.	**Rutaceae** *Citrus lemon* Linn. *Murraya exotica*Linn.	*Alternaria aternata* (Fr.) Keissler. *Botrydiploidia theobromae* Pat.	Shrawasti
33.	**Solanaceae** *Solanum tuberosum* Linn. *Solanum melongena*Linn. *Lycopersicon esculentum*Linn. *Datura stramonium*Linn. *Capsicum annuum* Linn. *Solanum nigrum* Linn.	*Alternaria aternata*(Fr.) Keissler. *Alternaria solani* Nees. *Cladosporium oxysporum* Berk & Curt *Cladosporium tennussimum* Cke. *Colleotrichumcapsici*Butter &Bisby *Phomopsis capsica* Magn. *Pseudocercospora atromarginalis* (Atk.) Deighton	Maharajganj
34.	**Verbenaceae** *Clerodendruninerme* Linn. Gaertn. *Clerodendrum indicum* Linn. *Clerodendrum viscosum* Linn. *Lantana camara* Linn. *Lantana indica* Linn.	*Amerosporium polynematoides* Speg. *Cercospora clerodendri* Miyake. *Fusarium concolor* Reink. *Corynespora clerodendriviscosae* Giisow. *Corynespora lanthanum* Sharma et al. *Pseudocercospora*sp. Speg.	Shrawasti

CONCLUSION

The Pathogenic Fungi causes huge losses every year in different parts of the world. The fungal pathogens producing leaf spots infect a large variety of hosts including most of the crops, forests and other plants. The destruction caused by these enemies of leaves is a serious problem before us. The focus of this research is identification & documentation of Pathogenic fungi which will assist in the discovery of new fungicides and ideas to overcome from the severity of these enemies of nature as well as in the protection of floral diversity from the infection of these pathogens and also in the conservation of valuable flora of the area.

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